

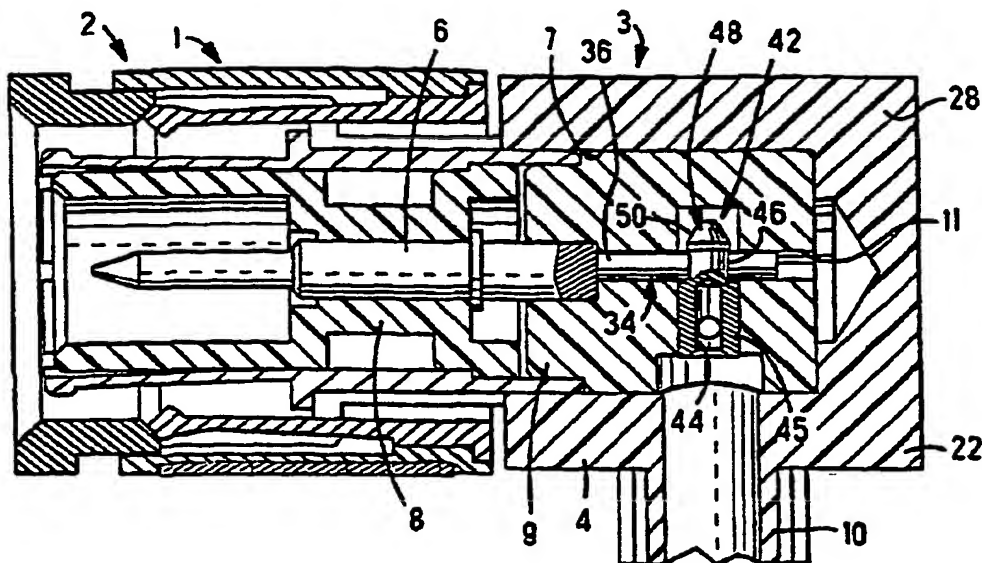
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(21) International Application Number: PCT/IB96/00284 (22) International Filing Date: 4 April 1996 (04.04.96) (30) Priority Data: 9507151.0 6 April 1995 (06.04.95) GB (71) Applicant (for all designated States except US): THE WHITAKER CORPORATION [US/US]; Suite 450, 4550 New Linden Hill Road, Wilmington, DE 19808 (US). (72) Inventors; and (75) Inventors/Applicants (for US only): BOZZER, Dieter [DE/DE]; Lange Rötterstrasse 51, D-68167 Mannheim (DE). DUQUERROY, Patrik [DE/DE]; Friedhofstrasse 22, D-63500 Seligenstadt (DE). (74) Agents: NINA, Driscoll, A. et al.; AMP International Enterprises Ltd., AMPèrestrasse 3, CH-9323 Steinach (CH).	(81) Designated States: BR, CA, CN, JP, KR, NO, US, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i>	

(54) Title: RIGHT ANGLED COAXIAL CONNECTOR



(57) Abstract

A coaxial connector (2) for connection to a coaxial cable comprises an inner terminal (6) having a connection end (34) comprising a pair of spaced-apart resilient arms (36). The inner terminal is surrounded by an outer conductor housing (4) having a transverse cable inlet section (10). A wire end adapter (42) is securely attachable to an inner conducting wire of the coaxial cable such that the cable can be inserted into the cable inlet (10) and the inner conductor plugged to the terminal (6) by engagement of the wire end adapter (42) with the resilient arms (36) of the inner terminal (6). This allows rapid assembly of the cable to the coaxial connector.

RIGHT ANGLED COAXIAL CONNECTOR

This invention relates to an electrical coaxial connector for right angled connection to a coaxial cable.

5 Coaxial cable typically comprises an inner conductor and an outer conductor concentrically mounted therearound and separated from the inner conductor by a dielectric. The outer conductor is usually connected to ground and acts as a shield around the inner conductor for
10 transmission of high speed data signals. A connector that is assembled to a coaxial cable has an outer conductive shell that is connected to the outer conductor of the coaxial cable in a manner to prevent minimum leakage (and therefore attenuation) of the signal transported by the
15 cable. The latter is done by providing an effective connection surrounding the whole circumference of the outer conductor leaving as few gaps as possible therebetween. The inner conductor is connected to the central pin or receptacle contact of the coaxial connector
20 which is separated from the outer housing by a dielectric housing. In many coaxial connectors, the central conductor is a component machined from solid stock rather than stamped and formed for reasons, for example, of quality, size, tolerance requirements etc. For machined inner
25 contacts, reliable connection thereto is often made by soldering, as crimped or clamping connections to the cable inner conductor pose problems due to the size of the central conductor and material properties of machined contacts as well as the small dimensions of the parts.

30 An example of a prior art coaxial connector is shown in Figure 4, the connector 102 comprising an outer conductive housing 104, an inner contact 106 and a dielectric housing 108 for insulatively supporting the inner conductor within the outer housing 104. The outer
35 housing 104 comprises a cylindrical cable inlet 110 that projects at a right angle from the outer housing in relation to the longitudinal direction of the inner contact 106. The coaxial cable 112 comprises an inner

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conductor 114 surrounded concentrically by an outer conductor 116 separated therefrom by a dielectric layer 118. The inner conductor 114 is stripped over a certain length from the dielectric 118 for connection to the inner
5 contact 106 by soldering thereto. Access to the solder connection 120 is provided at a rear end 122 of the housing 104 remote from a mating end 124, by provision of a through bore 126 that is closed by a cap 128 threadably engaging the bore 126 after soldering of the conductor 114
10 to the contact 106. The outer shielding 116 is mounted within the cable receiving extension 110 for contact therebetween and minimal leakage of signals.

One of the problems with the aforementioned prior art, is the high cost of assembly, due to the soldering
15 operation and the need to provide a cap 128 to ensure a sealed and fully shielded connector. It would be desirable to reduce assembly and manufacturing costs of the connector to a coaxial cable, whilst nevertheless providing a reliable connection with effective shielding
20 and sealing.

It is therefore an object of this invention to provide a coaxial connector for rapid assembly to a coaxial cable, and effective shielding.

It is a further object of this invention to provide
25 very cost-effective and reliable right angled coaxial connector.

Objects of this invention have been achieved by providing a coaxial connector comprising an outer housing and an inner contact, the outer housing having a cable
30 receiving portion extending transversely from the outer housing for receiving a coaxial cable therein, the inner contact comprising a contact portion for mating with a complementary connector, and a connection section for contacting the inner conductor of the coaxial cable, the
35 contact section comprising a clip for elastically latching to a connection piece, the connection piece being securely, permanently fixable to the inner conductor of the coaxial cable prior to connection with the inner

contact. The coaxial cable can thus be pluggably mounted to the coaxial connector due to pluggable connection of the inner conductor to the inner contact. In an advantageous embodiment, the inner contact comprises a pair of cantilever beam arms extending in the axial direction, and biasable apart by plugging of the connection member therebetween in a direction substantially orthogonal to the axial direction. The connection member could have a reduced width portion for receiving the resilient inner contact connection arms thereagainst for retention of the inner conductor to the inner contact. Advantageous features of the invention are described in the claims.

A preferred embodiment of this invention will now be described by way of example with reference to the figures, whereby:

Figure 1 is a cross-sectional view through a right angled coaxial connector;

Figure 2 is a side view of an inner contact of the connector of Figure 1;

Figure 3 is a top view of the contact of Figure 2; and

Figure 4 is a cross-sectional view through a prior art connector.

Referring to Figure 1, a coaxial connector 2 comprises a mating section 1 and a connection section 3. The mating section 1 is for coupling to a complementary coaxial connector (not shown). The mating section 1 of the connector 2 may have a similar design to any conventional coaxial connector, and will thus not be described further.

The connector 2 comprises an axially extending inner terminal 6 mounted in dielectric housings 8 and 9 that are surrounded by an outer conductor 4. The dielectric housing 8 is positioned towards the mating end and the dielectric housing 9 is positioned towards the connection end, where the outer housing 4 substantially surrounds the connection end dielectric housing 9. The outer conductor 4 comprises an axial cavity 7 for receiving the housing 9 and the

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inner conductor 6 therein. Extending from the outer conductor 4 is a cable receiving inlet 10 for receiving a coaxial cable similar to the cable 112 shown in Figure 4.

5 The outer conductor 4 has an end wall 28 that closes the cavity 7 at an axial end 22 remote from the mating section 1. The latter ensures effective sealing and shielding of the connector.

Referring to Figures 2 and 3, the inner terminal 6 comprises a contact section 30 for mating with a
10 complementary contact of a complementary connector, an intermediate mounting section 32 and a connection section 34 that comprises a pair of spaced apart resilient beams 36. The terminal 6 is mainly cylindrical in shape and is machined from solid stock, where the resilient arms 36
15 have flattened, recessed top and bottom sides 38,40. The flattened top and bottom sides 38,40 of the connection portion 34 enable polarizing of the terminal with respect to the housing 9 to prevent rotation thereof, in order to ensure pluggable connection with the cable conductor.

20 Referring to Figures 1, 2 and 3, a wire end adapter 42 is for secure attachment, by means of crimping or soldering, to the inner wire conductor 114 of a coaxial cable similar to that shown in Figure 4. The wire end adapter 42 comprises a body section 45 surrounding a wire
25 end receiving cavity 44 for receiving the cable inner conductor 114 therein, a connection portion 46 and a head section 48. The adapter 42 is generally axi-symmetric in shape where the contact section 46 is recessed with respect to the body section 45 and also with respect to
30 the head 48. The head 48 comprises a conical portion 50 for enabling insertion between the resilient arms 36 and biasing apart thereof. The contact section 46 of the adapter 42 is long enough to receive the connection end resilient arms 36 therein so as to securely retain the
35 adapter 42 in connection with the terminal 6 once plugged therewith. The body section 45 is deformable such that it can be crimped to the inner conductor for rapid, and secure mechanical and electrical connection thereto.

The adapter 42 can thus be securely and permanently attached to the inner conductor of a coaxial cable by means of crimping or soldering in an assembly step independent of manufacturing and assembly of the rest of the coaxial connector 2. Connection of the cable 112 to the connector 2 can then be performed by merely inserting the cable into the cable inlet 10 until latching of the adapter 42 to the inner terminal connection end arms 36. This plugging connection between the cable inner conductor and the coaxial cable inner terminal 6 is thus rapid and therefore cost-effective, and furthermore does not require the provision of the cap member 128 of the prior art outer conductor 104. The latter requires more parts, more assembly procedures and less shielding and sealing reliability. The coaxial cable can then be attached to the cable inlet 10 in a conventional manner.

Advantageously therefore, the plugging connection of the coaxial cable inner conductor allows rapid assembly of the cable to the connector, and furthermore reduces manufacturing costs of the connector whilst nevertheless providing effective shielding and sealing thereof. The latter is particularly advantageous for right angled coaxial connectors where the transverse joining of inner and outer conductors of the cable to the connector is more difficult than for an in-line connection.

CLAIMS

1. A right-angled coaxial connector for connection to a coaxial cable having an inner conductor and an outer conductor separated by a dielectric, comprising an inner axially extending terminal (6) having a mating contact section (30) and a connection section (34) mounted in a dielectric housing (9), and an outer conductive housing (4) surrounding the dielectric housing (9), the outer conductive housing (4) comprising a cable inlet (10) extending substantially orthogonally from the conductive housing (4) in relation to the axial direction, the cable inlet (10) comprising a cavity for receiving the coaxial cable therein, characterized in that the connector comprises a wire end adapter (42) permanently fixable to the cable inner conductor, the connection section (34) of the inner terminal having resilient members (36) for pluggable connection to the wire end adapter.
2. The connector of claim 1 characterized in that the resilient members (36) are a pair of spaced-apart cantilever beam resilient arms (36) extending axially from the contact section (30).
3. The connector of claim 2 characterized in that the inner terminal is generally axi-symmetric except for the resilient arms (36), which have at least one recessed side (38,40) for polarising the inner terminal (6) with respect to the dielectric housing (9) which has a corresponding cavity (11) for receiving the resilient arms (36) therein.
4. The connector of claim 1 characterized in that the wire end adaptor (42) comprises a head section (48) for biasing apart the inner terminal resilient arms (36) during plugging connection, a connection portion (46) and a body section (45) having a wire receiving cavity (44), the connection portion (46) being recessed with respect to the head section (48) for secure retention to the inner

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terminal.

5. The connector of claim 4 characterized in that the wire end adapter is generally axi-symmetric in shape.

5

6. The connector of claim 5 characterized in that the head section (48) has a conical portion (50) for insertion between the inner terminal resilient arms (36) and biasing apart thereof.

10

7. The connector of claim 5 characterized in that the body section (46) extends over the wire receiving cavity (44) and is deformable for crimping connection to the cable inner conductor.

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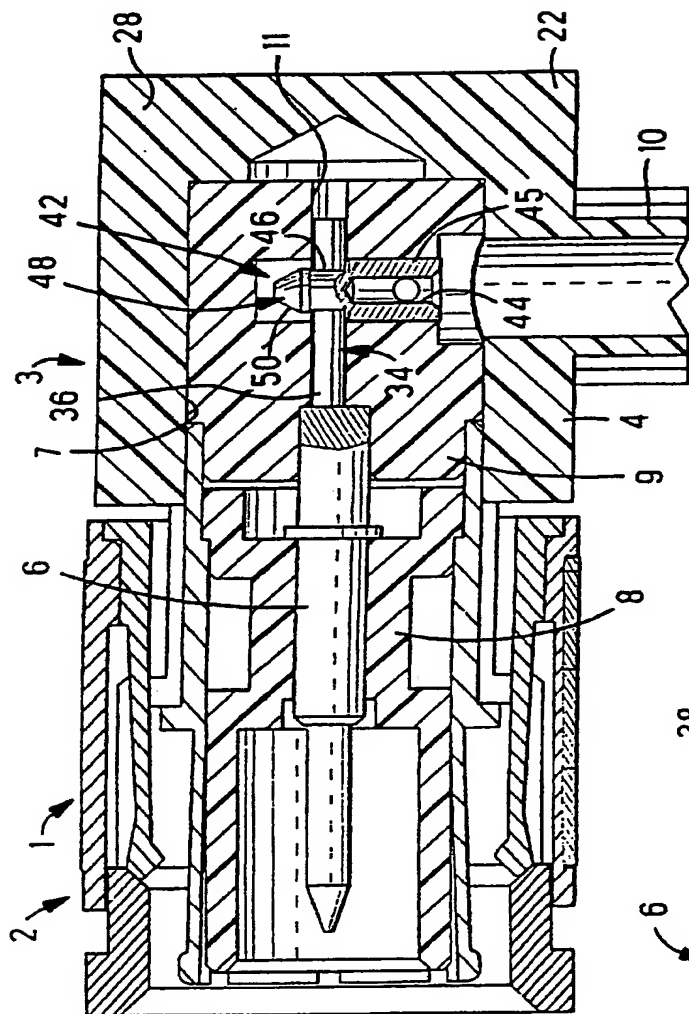


FIG. 1

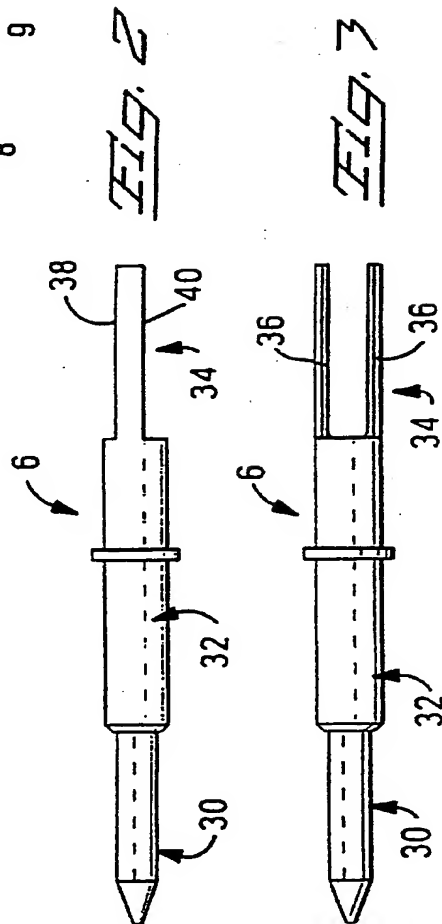
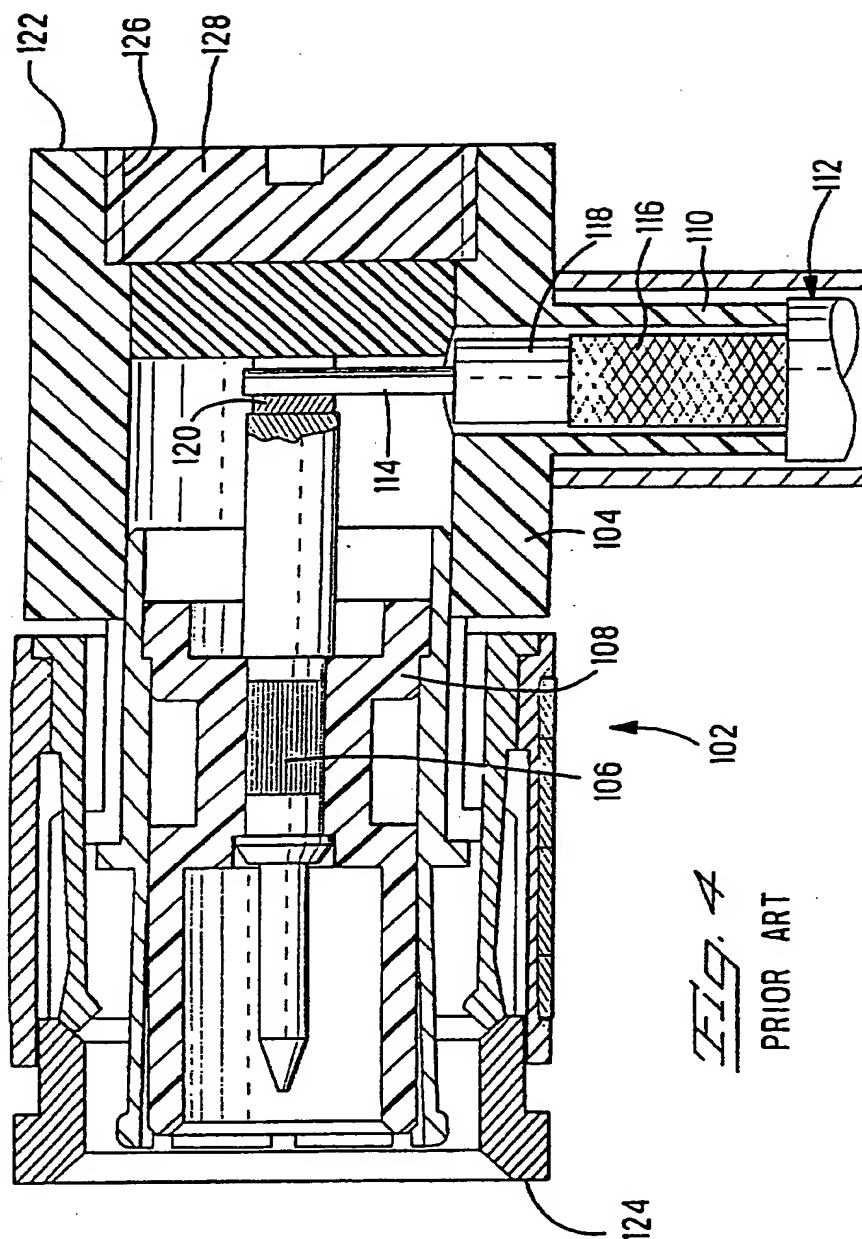


FIG. 2

FIG. 3



INTERNATIONAL SEARCH REPORT

International Application No
PCT/IB 96/00284

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A-4360244	23-11-82	CA-A- 1148628	21-06-83
DE-A-1440201	07-11-68	NONE	
US-A-5312272	17-05-94	NONE	
US-A-5037329	06-08-91	NONE	

INTERNATIONAL SEARCH REPORT

International Application No
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A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H01R17/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 H01R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US,A,4 360 244 (FORNEY JR EDGAR W ET AL) 23 November 1982	1,2
A	see column 2, line 45 - column 3, line 57; figures 1,1A	3-7
A	--- DE,A,14 40 201 (SIEMENS AG) 7 November 1968	4-6
A	see page 5, line 7 - line 12; figure 1	
A	--- US,A,5 312 272 (LAI YANG-CHUAN) 17 May 1994	4-6
A	see column 3, line 3 - line 23; figures 3,4	
A	--- US,A,5 037 329 (WRIGHT JOHN O) 6 August 1991	1,2
	see column 3, line 40 - column 4, line 48; figures 2,3	

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☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

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